**Study guide of your final exam**

The exam will cover the materials after mid-term exam. What you need to study:

(1) lecture notes (after mid-term exam)

(2) quiz (Quiz #3-5)

(3) reading assignments (the questions we discussed during the class).

The final exam will have (1) multiple choices; (2) short answer; (3) true or false; (4) short essay.

The short essay will include some of the following points that I keep emphasizing in this class:

1. The proximate and ultimate questions of animal behavior, and come up with testable hypotheses.
2. Different animal species have different intelligence, some animals can detect magnetic field, some can produce or detect ultrasounds; bowerbirds can build extraordinary courtship arena to court females; and social insects are highly altruistic.
3. Innate and learning behavior: you might realize even the most complex learned behaviors are, to a certain degree, under the control of innately genetic program. On the other hand, simple innate behaviors often times can be modified by experience.
4. Parental care: Parental care has a big impact on the mental development (stress response) of young, and importantly, this behavior can be passed to the next generation without genetic mechanism (through epigenetic program: environmental agents change the on or off of gene expression). Abusive mother rats are more likely to abuse baby rats🡪 baby rats grow up

🡪 become abusive mother 🡪…….

1. Evolution of social behavior:
2. Define the different types of social interactions: Mutualism, Reciprocity, Altruism, Selfish behavior. Provide examples.
3. What is “prisoner’s dilemma” and “tit for tat”? how does it work and how can it be applied to Animal behavior, provide example?
4. How does altruism evolve? Define inclusive fitness, Hamilton’s rule, and kin selection, provide example for each term. What the genetic relatedness between relatives? How to calculate inclusive fitness. Understand the example of pied kingfisher: juveniles have 3 strategies to choose: as a primary helper, secondary helper, or a delayer.
5. Define “eusocial” behavior, examples in insects and mammals? How does it evolve? What is haplodiploid?
6. Social dominance and hormone: the short term and long term effect of social-stress hormone on health. Is it more stressful to be a dominant one, a subordinate one, or both?
7. The animal species that is more social does not mean it is more adaptive, it all depends on the benefit and cost of each species to best adapt to their local environment. Social behavior is more likely to evolve when benefit of evolving it is great than its cost.
8. Based on the modern view of natural selection, behavior is more likely to be evolved through the selection of individual? or group? Or genes? Why group selection may not work?
9. Evolution of cognition:
10. What is cognition? Examples in vertebrates and invertebrates.
11. Understand the examples of Clever Hans and Blue tits. To better understand animal’s mind and intelligence (or cognition), you need to understand the animal’s natural history. The blue tit has the intelligence to open the milk bottle because, perhaps, a similar skill (e.g., open the tree trunk) has been regularly used by the tit in its daily routine behavior in nature.
12. What is Alex (parrot)’s cognitive behavior? How is it different from chimps or dolphins?
13. Vocal mimics and evolution of music. Why parrots (but not other animals) seem to dance and respond to human’s music?
14. Requirements for the evolution of social intelligence? Examples from ground squirrels and velvet monkeys (calls).
15. How to demonstrate animals’ self-awareness? What animals show this capability.
16. Development of social intelligence and social skills: Play. Define what is play, and its possible function. Provide examples of animal play in vertebrates and invertebrates.
17. Logic: how to demonstrate animals have logic (deductive, inductive, same/different)? Provide examples and design experiments to test animal’s rational thought.
18. What animals have gestural language? How do scientists test their ability of gestural language.
19. Animal and human intelligence.
20. Discuss how human intelligence might have evolved from animals and provide examples.
21. Two major ultimate hypotheses, based on natural selection, of the evolution of human intelligence. Understand the main difference.
22. Is language necessary for cognition? Provide examples to support your point of view. How does human language can facilitate the development of intelligence? Is language innate, learned behavior, or both? Provide examples about what components of language are innate or learned.
23. The origin of human language. Provide at least one hypothesis and an example. The similarity and differences between spoken language and gestural language.
24. Personality:
25. what animals have personality? Do invertebrate have it? Design a behavioral experiment to demonstrate animals do have personality.
26. Great tit’s personality is associated with what neurotransmitter, and is associated with what gene? Humans also have the same gene that is associated with personality and other similar behavioral trait.
27. Our behaviors are partially determined by genes, including personality. There are many genes that are associated with our personality. However, a shy person can still be changed to a leader with constant reinforcement and effort, or changing social environment.
28. Personality is a pleiotrophy trait (what is it?), a person’s personality is often associated with other morphological traits. Provide an example.
29. Provide a working hypothesis about how dogs might have originally evolved from wolfs, in personality, in morphology etc..
30. Briefly describe Dmitry Belyaev’s domesticatioin experiments on silver foxes. The selection of behavior (tameness) accompany with selection of morphology. Name one candidate hormone that is associated with these changes.
31. Over decades of selection of tameness, the brain gene expression has been dramatically changed from wild silver foxes to domestic ones.
32. Evolution of human culture and behavior:
33. According to evolutionary biologists, we can identify the evolutionary roots (shaped by natural selection) in human behaviors, including highly diverse human culture. Examples like mate choice, adoption, blood donation etc.
34. Blood donation, a culture phenomenon or has evolutionary roots. Provide testable hypothesis (based on natural selection) for each of these examples. And design an experiment to test these hypotheses.
35. Adoption, understand 3 hypotheses (based on natural selection) for evolution of adoption.
36. Mate choice. Provide examples about our innate preference of mate choice. How does human mate choice fit in the sexual selection theory (good gene hypothesis, direct benefit, sensory exploritation and runaway hypothesis).

Articles:

1. Cognition: Alex the African Grey parrot.
2. Animal cooperation
3. The pregnant women as a revving race car
4. Baboon study of social dominance and stress hormone.
5. What is the genetic basis of intelligence and personality (novelty seeking, bold, shy)? Why it is difficult to identify a “intelligence” gene?